

CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE BUFFALO RIVER WATERSHED

- 4.1 Background.
- 4.2. Characterization of HUC-10 Subwatersheds
 - 4.2.A. 0604000401 (Buffalo River)
 - 4.2.B. 0604000402 (Buffalo River)
 - 4.2.C. 0604000403 (Cane Creek)

4.1. BACKGROUND. This chapter is organized by HUC-10 subwatershed, and the description of each subwatershed is divided into four parts:

- i. General description of the subwatershed
- ii. Description of point source contributions
 - ii.a. Description of facilities discharging to water bodies listed on the 2002 303(d) list
- iii. Description of nonpoint source contributions

The Buffalo River Watershed (HUC 06040004) has been delineated into three HUC 10-digit subwatersheds.

Information for this chapter was obtained from databases maintained by the Division of Water Pollution Control or provided in the WCS (Watershed Characterization System) data set. The WCS used was version 2.0 (developed by Tetra Tech, Inc for EPA Region 4) released in 2003.

WCS integrates with ArcView[®] v3.x and Spatial Analyst[®] v1.1 to analyze user-delineated (sub)watersheds based on hydrologically connected water bodies. Reports are generated by integrating WCS with Microsoft[®] Word. Land Use/Land Cover information from 1992 MRLC (Multi-Resolution Land Cover) data are calculated based on the proportion of county-based land use/land cover in user-delineated (sub)watersheds. Nonpoint source data in WCS are based on agricultural census data collected 1992–1998; nonpoint source data were reviewed by Tennessee NRCS staff.

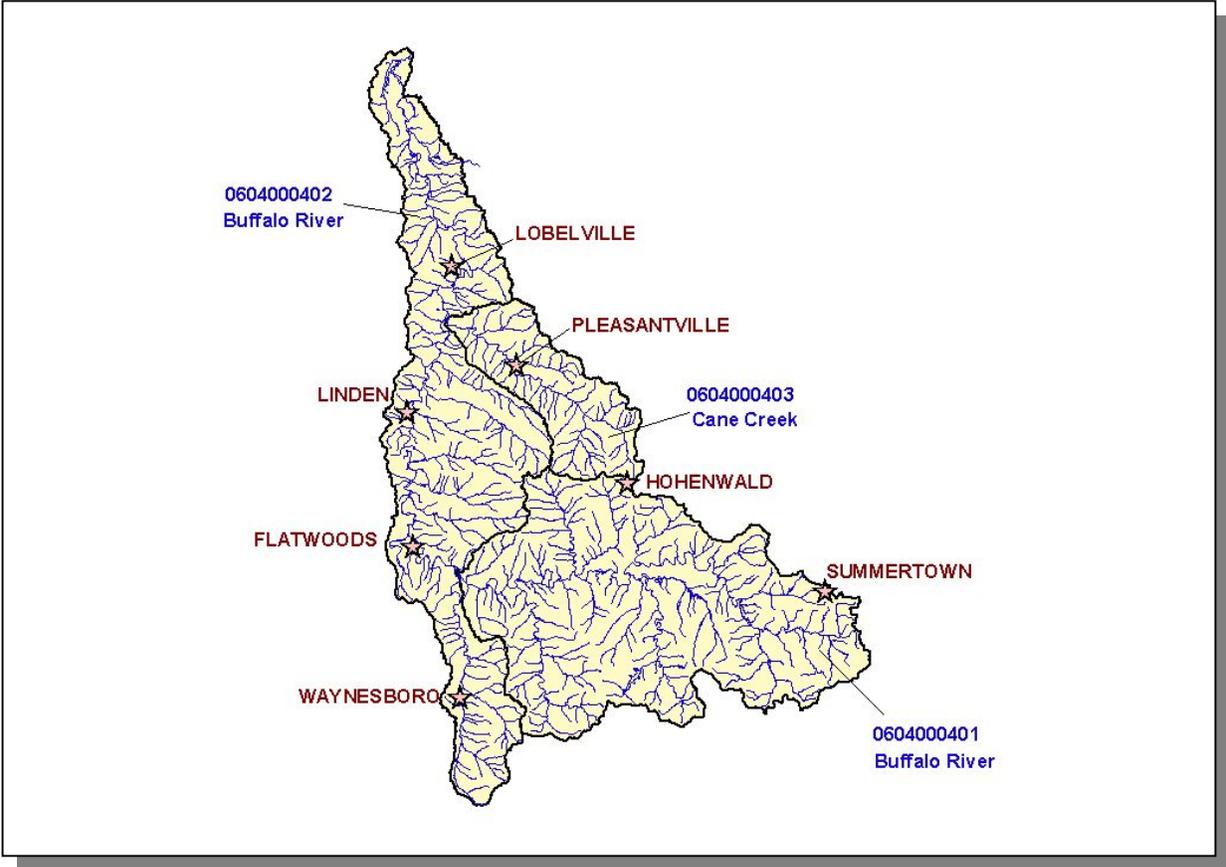


Figure 4-1. The Buffalo River Watershed is Composed of three USGS-Delineated Subwatersheds (10-Digit Subwatersheds). Locations of Flatwood, Hohenwald, Linden, Lobelville, Pleasantville, Summertown, and Waynesboro are shown for reference.

4.2. CHARACTERIZATION OF HUC-10 SUBWATERSHEDS. The Watershed Characterization System (WCS) software and data sets provided by EPA Region IV were used to characterize each subwatershed in the Buffalo River Watershed.

HUC-10	HUC-12
0604000401	060400040101 (Buffalo River)
	060400040102 (Buffalo River)
	060400040103 (Buffalo River)
	060400040104 (Buffalo River)
	060400040105 (Chief Creek)
	060400040106 (Little Buffalo River)
	060400040107 (Buffalo River)
	060400040108 (Fortyeight Creek)
	060400040109 (Buffalo River)
0604000402	060400040201 (Green River)
	060400040202 (Buffalo River)
	060400040203 (Buffalo River)
	060400040204 (Buffalo River)
	060400040205 (Buffalo River)
	060400040206 (Buffalo River)
0604000403	060400040301 (Upper Cane Creek)
	060400040302 (Lower Cane Creek)

Table 4-1. HUC-12 Drainage Areas are Nested Within HUC-10 Drainages. NRCS worked with USGS to delineate the HUC-10 and HUC-12 drainage boundaries.

4.2.A. 0604000401 (Buffalo River).

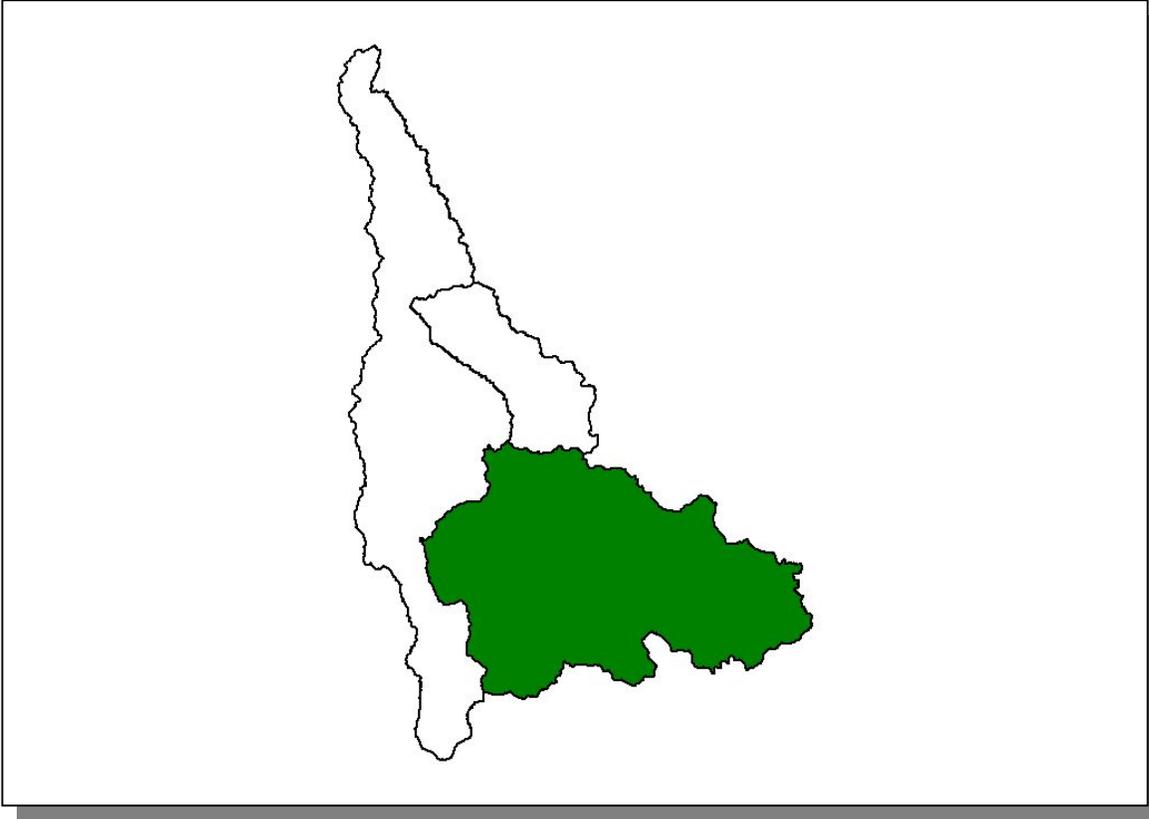


Figure 4-2. Location of Subwatershed 0604000401. All Buffalo River HUC-10 subwatershed boundaries are shown for reference.

4.2.A.i. General Description.

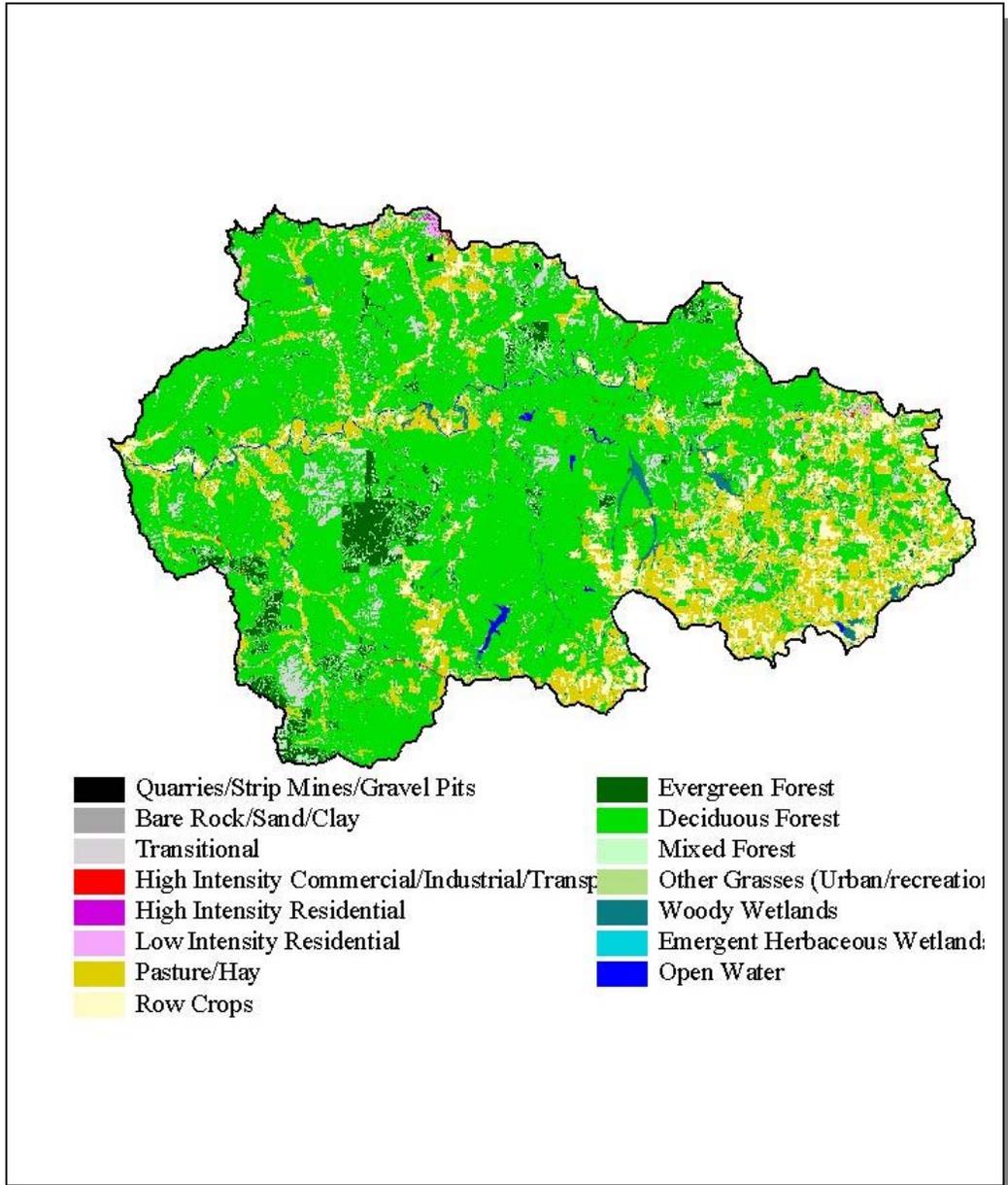


Figure 4-3. Illustration of Land Use Distribution in Subwatershed 0604000401.

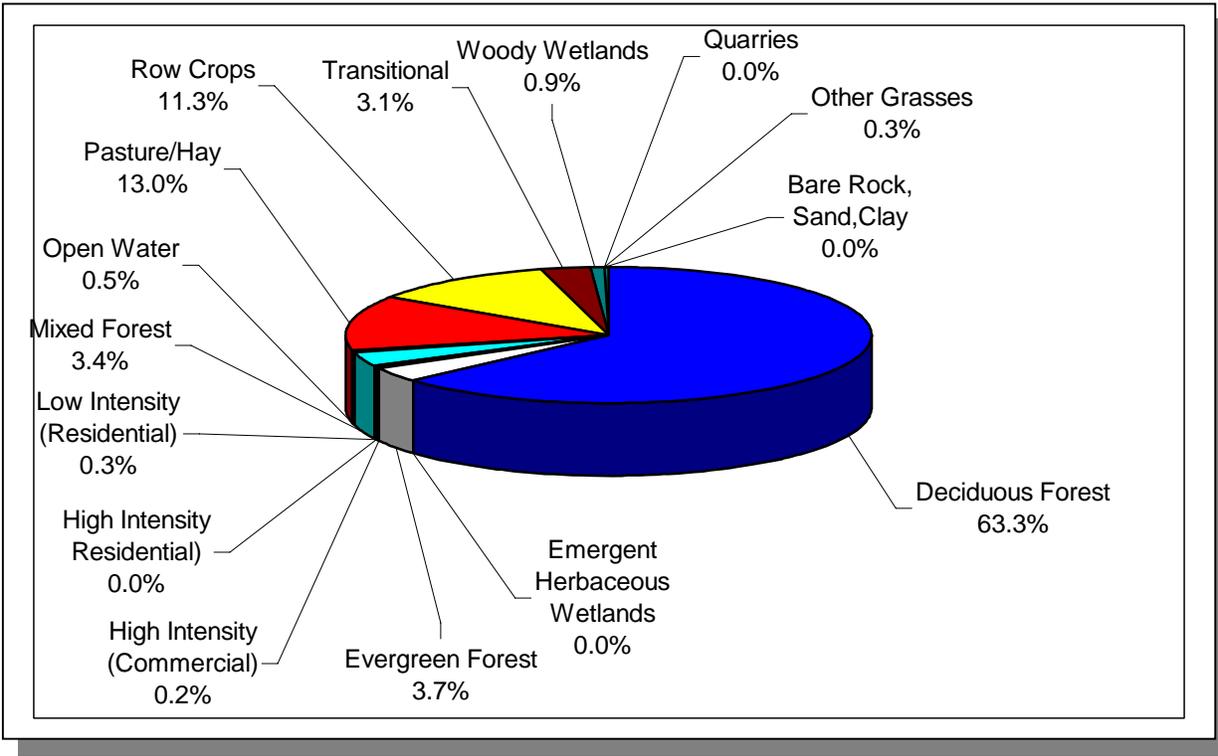


Figure 4-4. Land Use Distribution in Subwatershed 0604000401. More information is provided in Appendix IV.

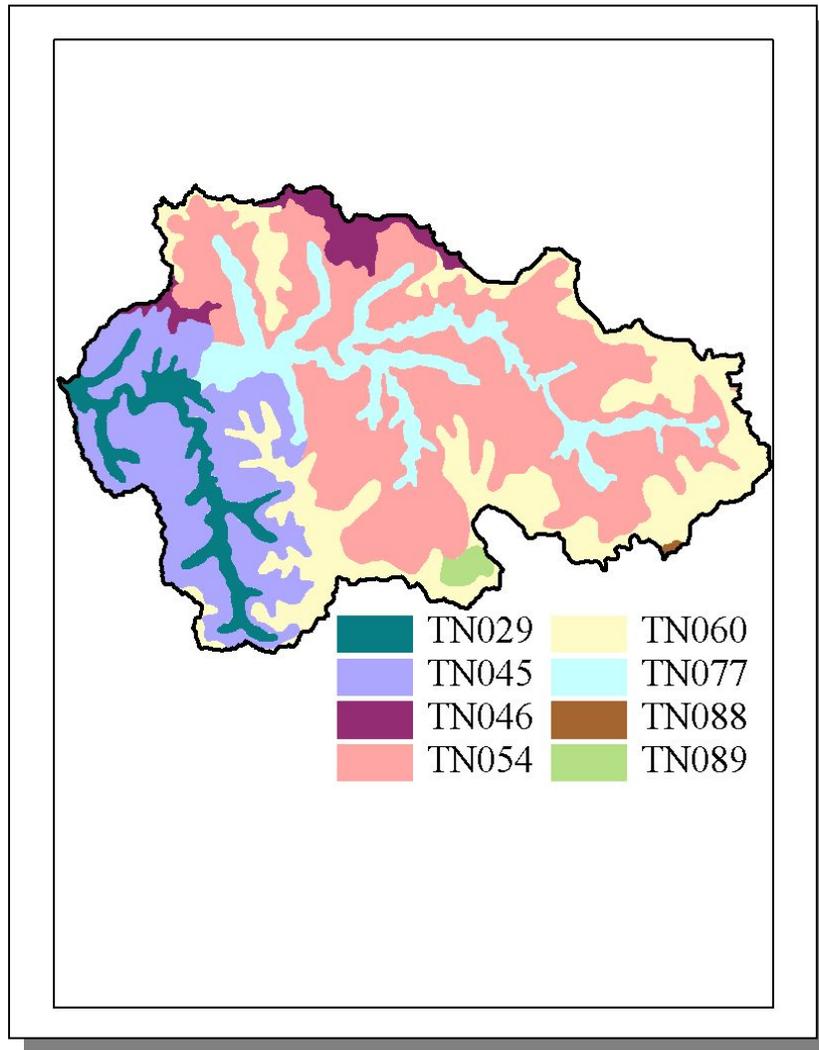


Figure 4-5. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0604000401.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN029	8.00	C	2.96	5.40	Loam	0.33
TN045	0.00	B	1.95	5.45	Loam	0.35
TN046	0.00	B	1.98	5.09	Silty Loam	0.38
TN054	0.00	C	3.04	4.84	Loam	0.32
TN060	5.00	B	1.30	5.32	Silty Loam	0.39
TN077	4.00	C	2.16	5.03	Loam	0.34
TN088	1.00	B	1.38	5.43	Silty Loam	0.34
TN089	3.00	B	1.46	5.36	Loam	0.35

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0604000401. More details are provided in Appendix IV.

County	COUNTY POPULATION			Portion of Watershed (%)	ESTIMATED POPULATION IN WATERSHED			% Change (1990-1997)
	1990	1997	2000		1990	1997	2000	
Lawrence	35,303	39,095	39,926	23.89	8,433	9,339	9,537	13.1
Lewis	9,247	10,789	11,367	38.67	3,576	4,172	4,396	22.9
Perry	6,612	7,438	7,631	0.03	<5	<5	<5	-
Wayne	13,935	16,498	16,842	14.33	1,997	2,364	2,414	20.9
Totals	65,097	73,820	75,766		14,008	15,878	16,3450	16.7

Table 4-3. Population Estimates in Subwatershed 0604000401.

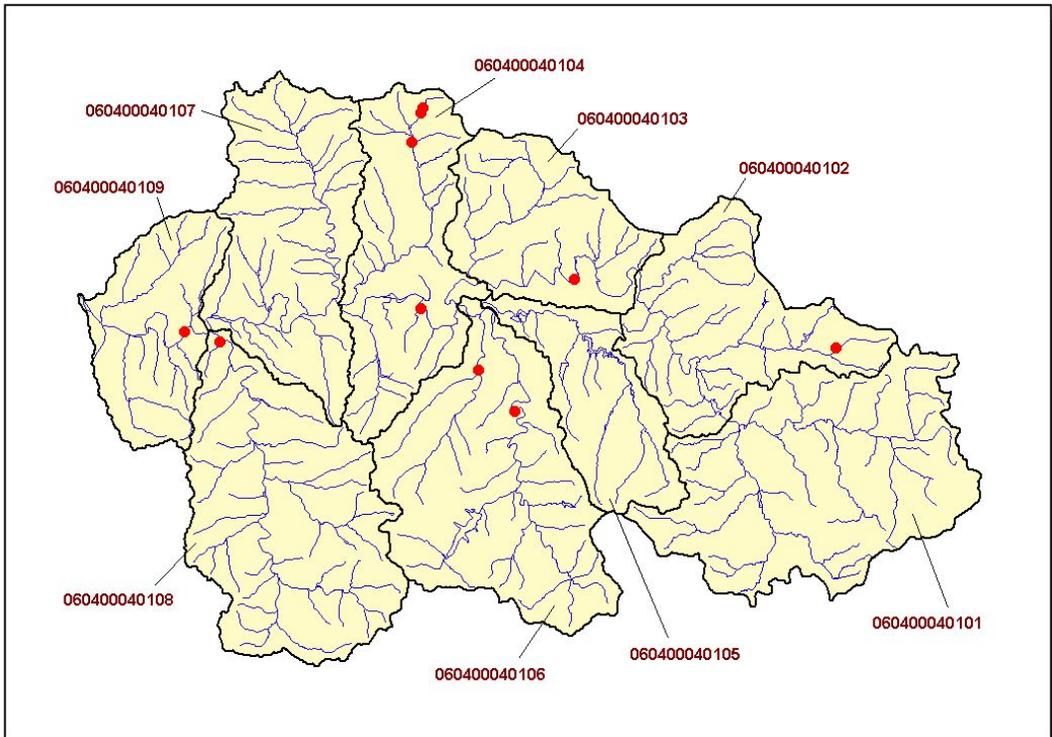


Figure 4-6. Location of STORET Monitoring Sites in Subwatershed 0604000401. Subwatershed 060400040101, 060400040102, 060400040103, 060400040104, 060400040105, 060400040106, 060400040107, 060400040108, and 060400040109 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.

4.2.A.ii Point Source Contributions.

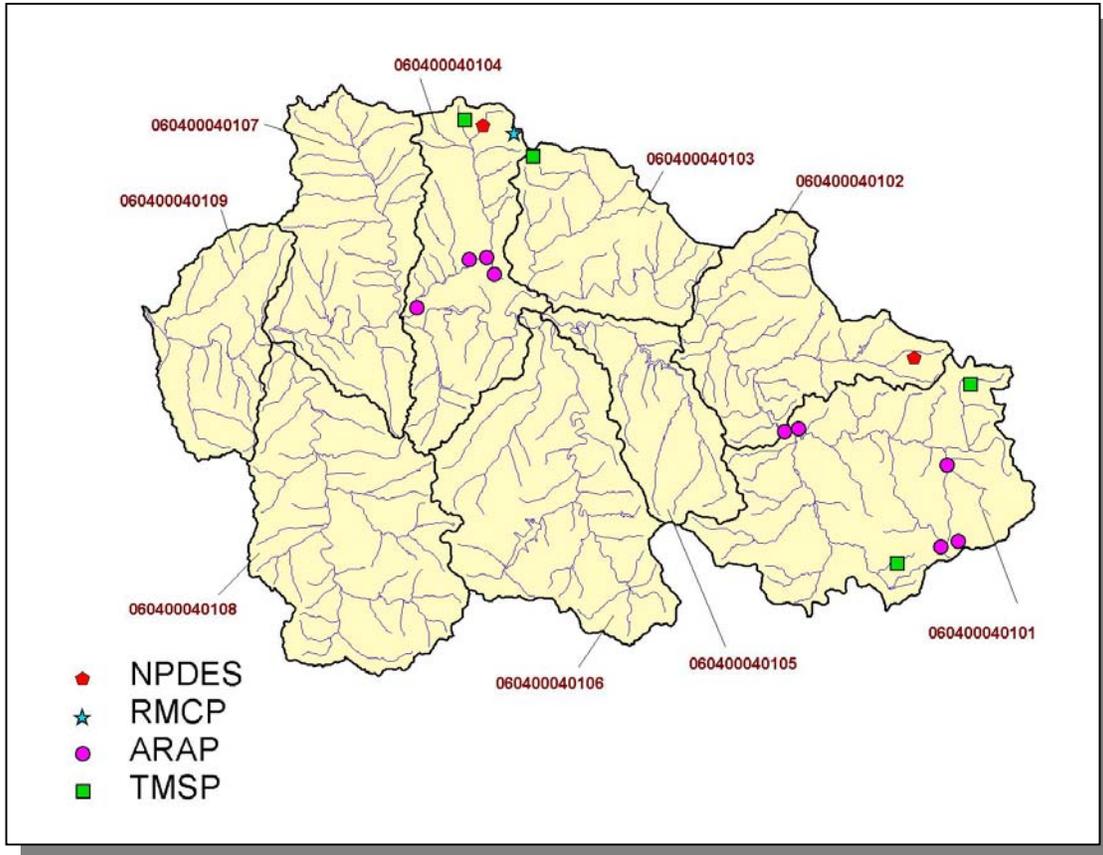


Figure 4-7. Location of Active Point Source Facilities in Subwatershed 0604000401. Subwatershed 060400040101, 060400040102, 060400040103, 060400040104, 060400040105, 060400040106, 060400040107, 060400040108, and 060400040109 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

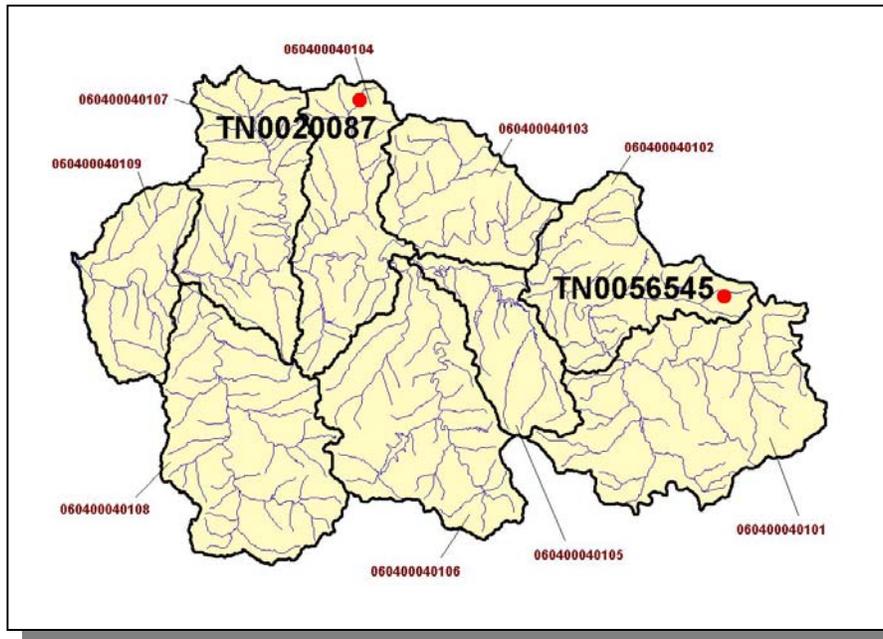


Figure 4-8. Location of NPDES Facilities in Subwatershed 0604000401. Subwatershed 060400040101, 060400040102, 060400040103, 060400040104, 060400040105, 060400040106, 060400040107, 060400040108, and 060400040109 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

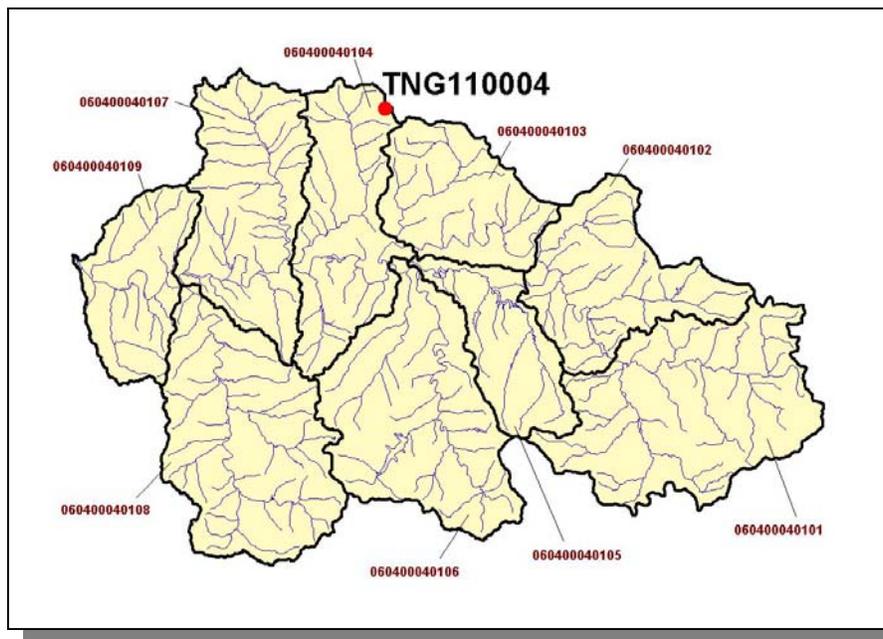


Figure 4-9. Location of Ready Mix Concrete Plants in Subwatershed 0604000401. Subwatershed 060400040101, 060400040102, 060400040103, 060400040104, 060400040105, 060400040106, 060400040107, 060400040108, and 060400040109 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

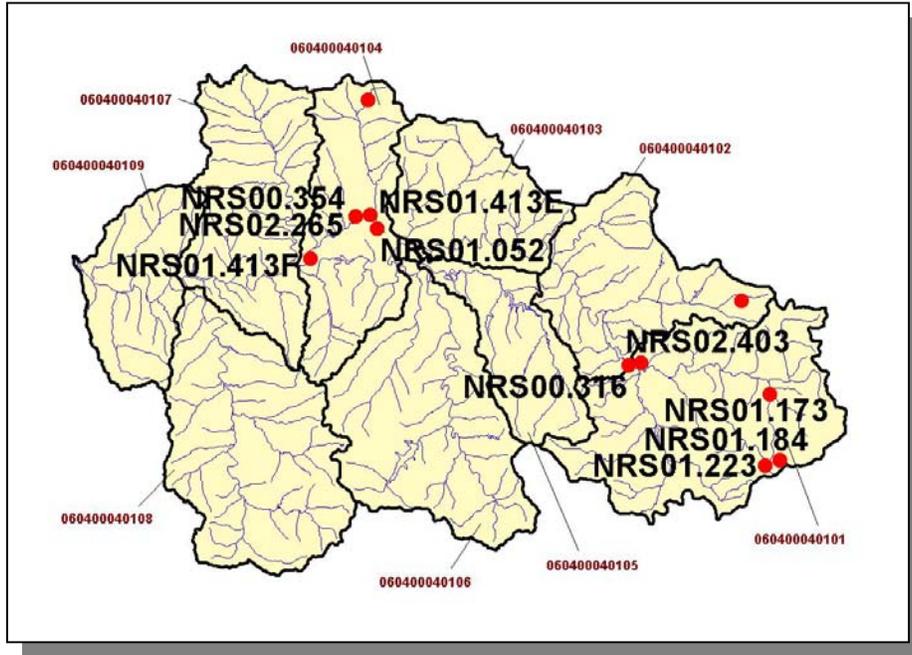


Figure 4-10. Location of ARAP Sites (Individual Permits) in Subwatershed 0604000401. Subwatershed 060400040101, 060400040102, 060400040103, 060400040104, 060400040105, 060400040106, 060400040107, 060400040108, and 060400040109 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

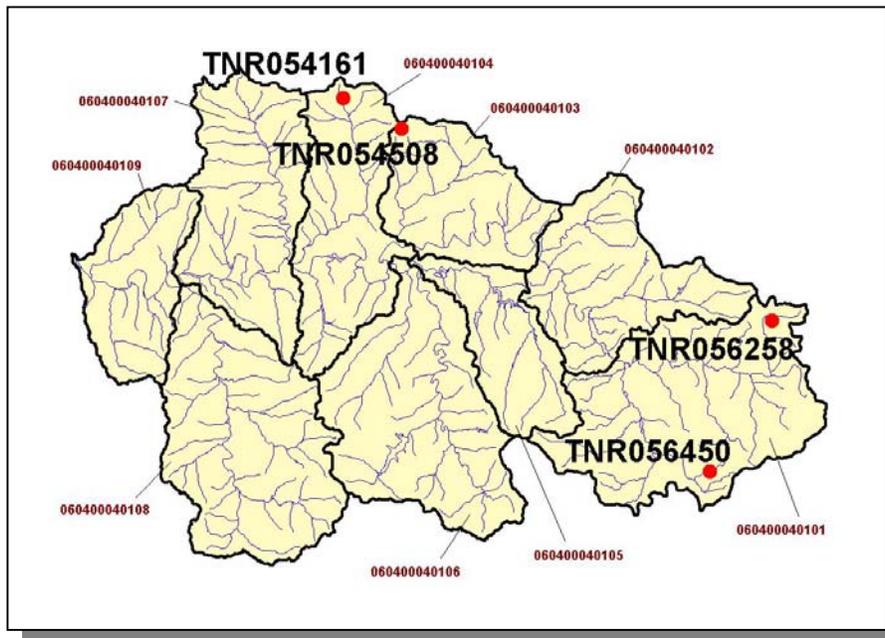


Figure 4-11. Location of TMSF Facilities in Subwatershed 0604000401. Subwatershed 060400040101, 060400040102, 060400040103, 060400040104, 060400040105, 060400040106, 060400040107, 060400040108, and 060400040109 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

4.2.A.ii.a. Dischargers to Water Bodies Listed on the 2002 303(d) List

There is one NPDES facility discharging to water bodies listed on the 2002 303(d) list in Subwatershed 0604000401:

- TN0020087 (Hohenwald High School STP) discharges to Mile 0.1 of a ditch to North Fork Shaw Creek @ RM 1.2

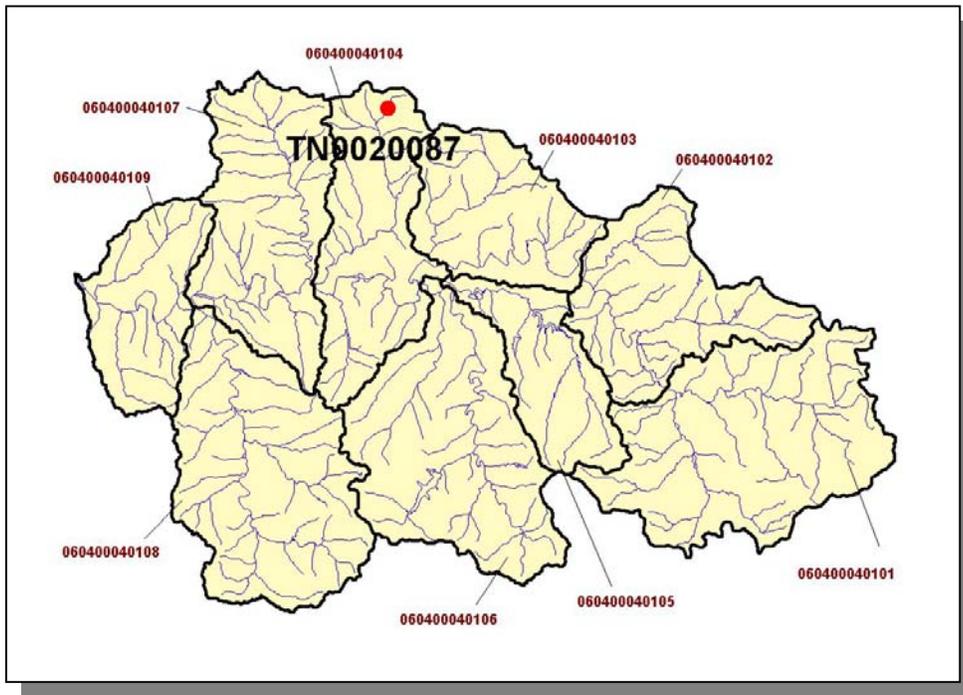


Figure 4-12. Location of NPDES Dischargers to Water Bodies Listed on the 2002 303(d) List in Subwatershed 0604000401. Subwatershed 060400040101, 060400040102, 060400040103, 060400040104, 060400040105, 060400040106, 060400040107, 060400040108, and 060400040109 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0020087	0	0	0	0	1.1

Table 4-4. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0604000401. Data are in million gallons per day (MGD). Data were obtained from the USGS publication Flow Duration and Low Flows of Tennessee Streams Through 1992 or from permit files.

PERMIT #	WET	CBOD ₅	NH ₃	Hg	TRC	TSS	CN	DO	pH
TN0020087	X	X	X	X	X	X	X	X	X

Table 4-5. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0604000401. WET, Whole Effluent Toxicity; CBOD₅, Carbonaceous Biochemical Oxygen Demand (5-Day); TRC, Total Residual Chlorine; TSS, Total Suspended Solids.

4.2.A.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Chickens (Broilers Sold)	Hogs	Sheep
10,774	20,299	748	30	8	3,228	100

Table 4-6. Summary of Livestock Count Estimates in Subwatershed 0604000401. According to the 1997 Census of Agriculture (<http://www.nass.usda.gov/census/>), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.

County	INVENTORY		REMOVAL RATE	
	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Lawrence	199.8	199.8	6.6	27.1
Lewis	158.0	158.0	4.0	10.2
Perry	223.6	223.6	5.1	22.0
Wayne	372.6	372.6	14.1	41.1
Total	954.0	954.0	29.8	100.4

Table 4-7. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 0604000401.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.65
Grass (Hayland)	0.21
Legumes, Grass (Hayland)	0.64
Grass, Forbs, Legumes (Mixed Pasture)	0.35
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	6.46
Cotton (Row Crops)	8.07
Sorghum (Row Crops)	4.17
Soybeans (Row Crops)	28.85
Wheat (Close-Grown Cropland)	14.15
All Other Close-Grown Cropland	1.80
Other Cropland not Planted	8.11
Conservation Reserve Program Lands	0.65
Non-Agricultural Land Use	0.00
Other Land in Farms	1.21
Farmsteads and Ranch Headquarters	2.95

Table 4-8. Annual Estimated Total Soil Loss in Subwatershed 0604000401.

4.2.B. 0604000402 (Buffalo River).

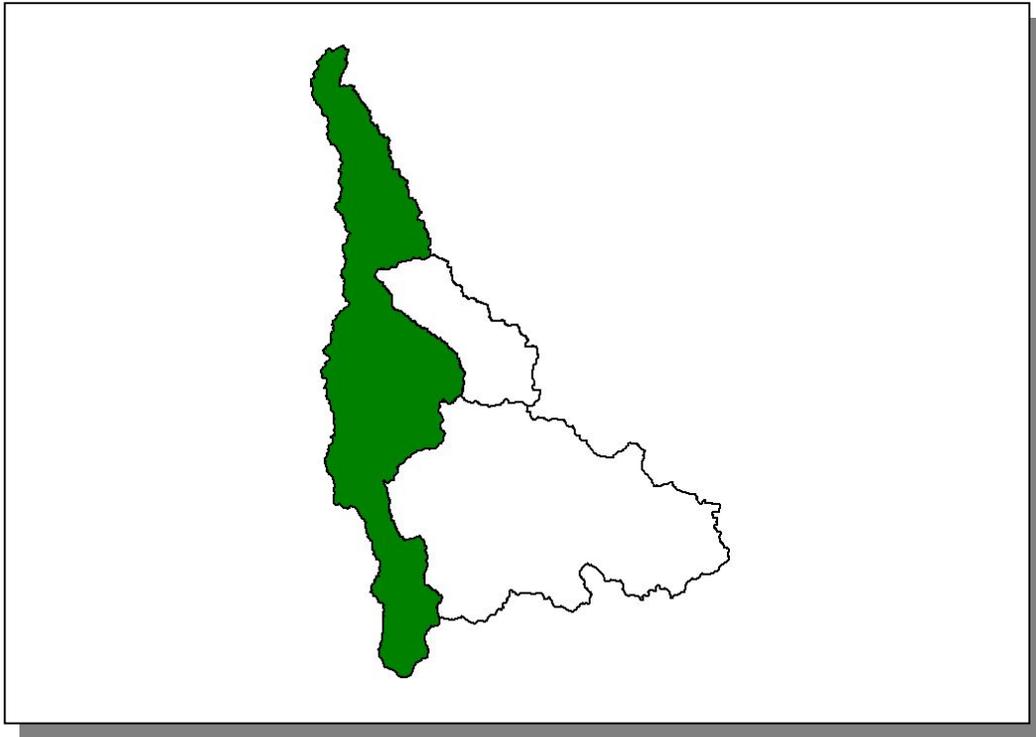


Figure 4-13. Location of Subwatershed 0604000402. All Buffalo River HUC-10 subwatershed boundaries are shown for reference.

4.2.B.i. General Description.

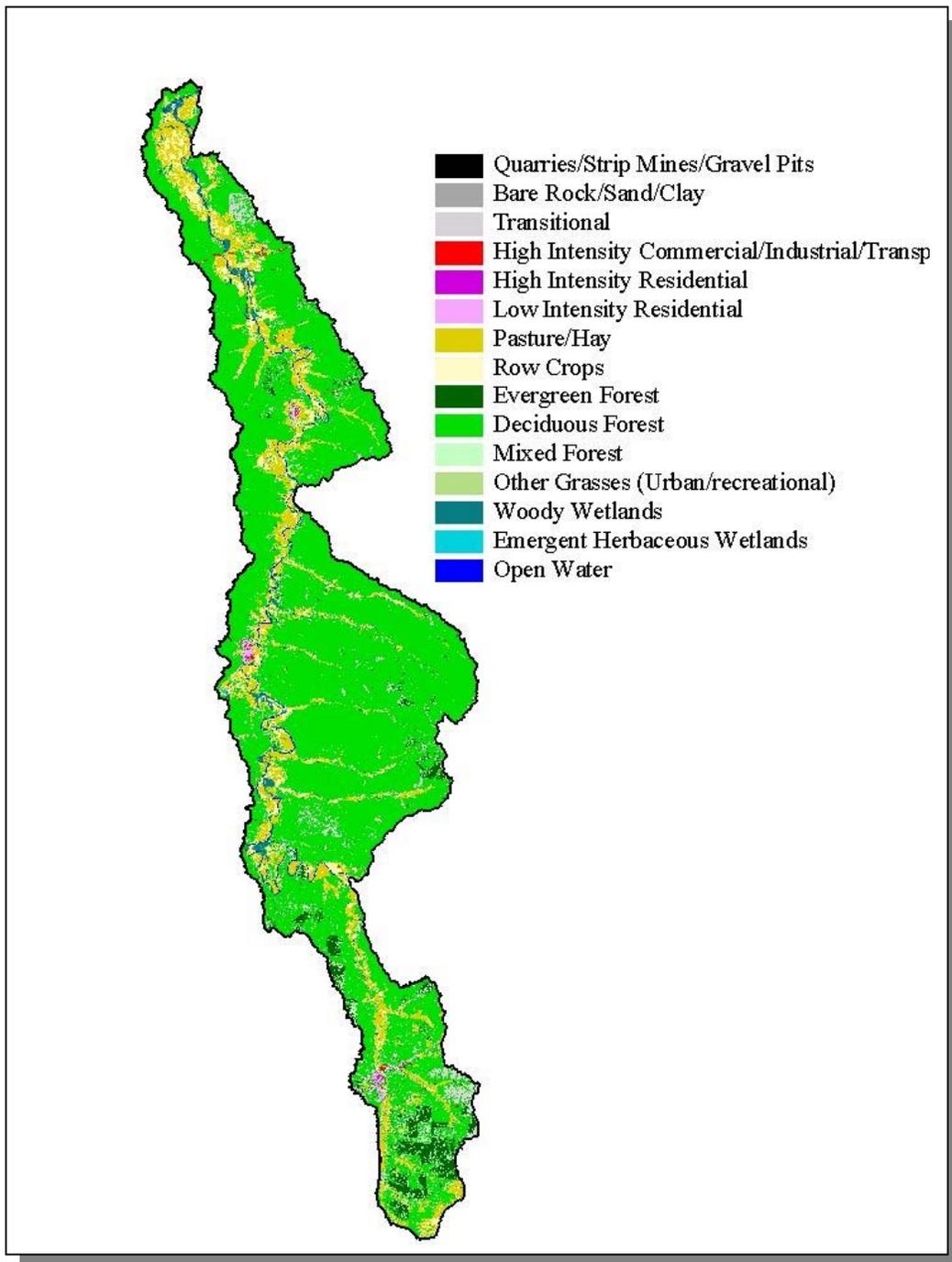


Figure 4-14. Illustration of Land Use Distribution in Subwatershed 0604000402.

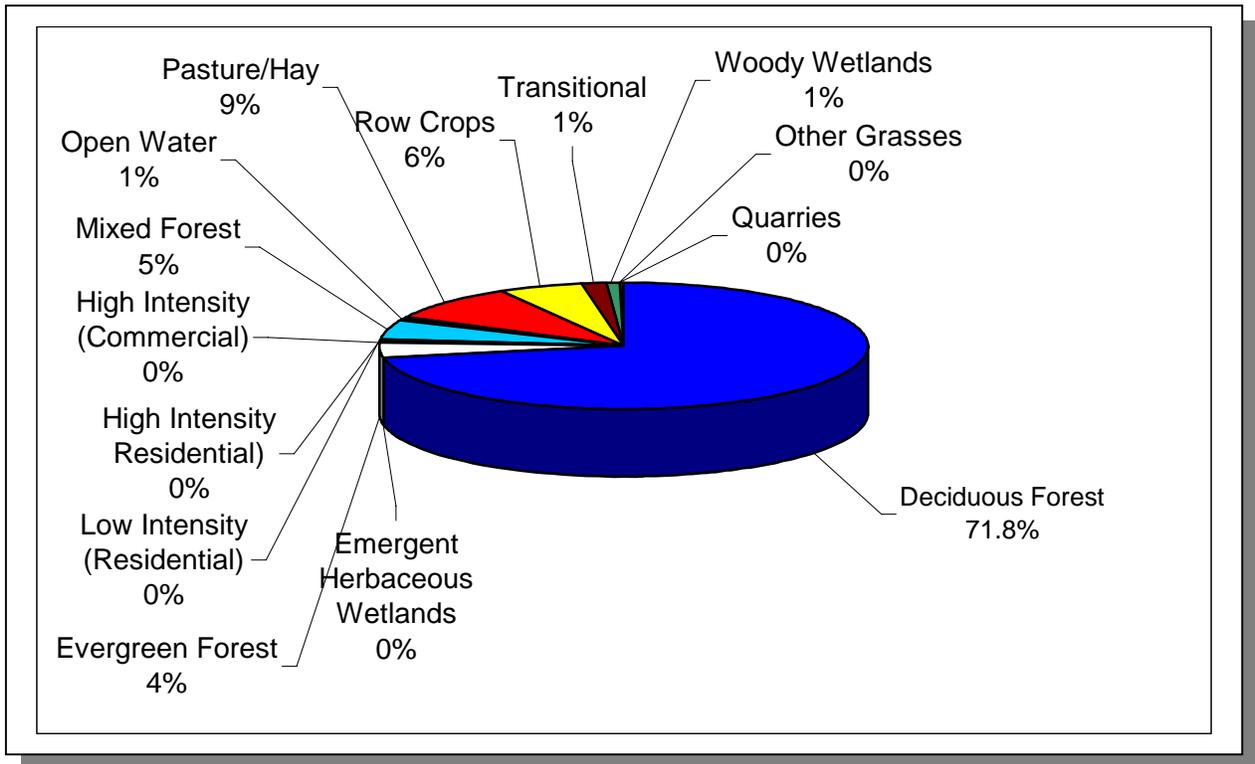


Figure 4-15. Land Use Distribution in Subwatershed 0604000402. More information is provided in Appendix IV.

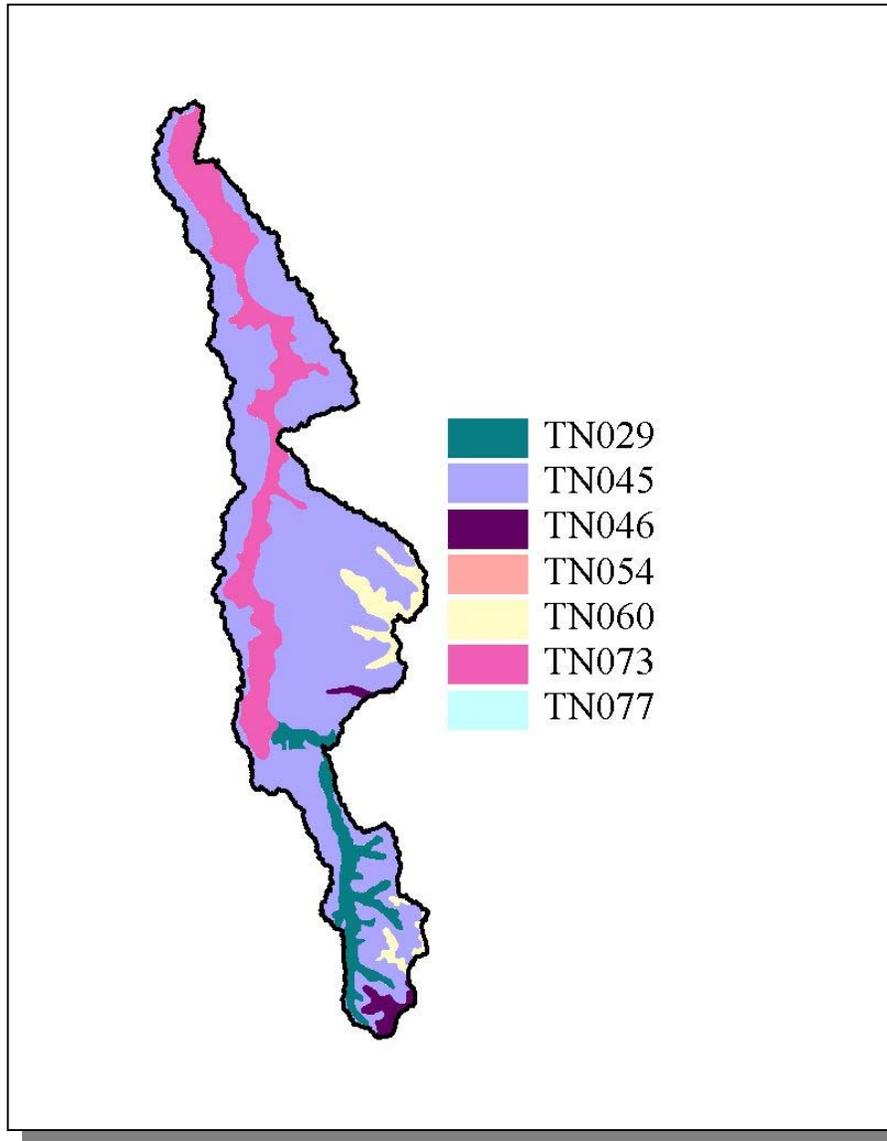


Figure 4-16. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0604000402.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN029	8.00	C	2.96	5.40	Loam	0.33
TN045	0.00	B	1.95	5.45	Loam	0.35
TN046	0.00	B	1.98	5.09	Silty Loam	0.38
TN054	0.00	C	3.04	4.84	Loam	0.32
TN060	5.00	B	1.30	5.32	Silty Loam	0.39
TN073	0.00	B	2.97	5.21	Loam	0.34
TN077	4.00	C	2.16	5.03	Loam	0.34

Table 4-9. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0604000402. More information is provided in Appendix IV.

County	COUNTY POPULATION			Portion of Watershed (%)	ESTIMATED POPULATION IN WATERSHED			% Change (1990-1997)
	1990	1997	2000		1990	1997	2000	
Hickman	16,754	19,926	22,295	0.68	114	135	151	32.5
Humphreys	15,795	16,839	17,929	7.41	1,171	1,248	1,329	13.5
Lewis	9,274	10,789	11,367	1.16	107	125	132	23.4
Perry	6,612	7,438	7,631	43.42	2,871	3,229	3,313	15.4
Wayne	13,935	16,498	16,842	11.67	1,626	1,925	1,965	20.8
Totals	62,343	71,490	76,064		5,889	6,662	689	17.0

Table 4-10. Population Estimates in Subwatershed 0604000402.

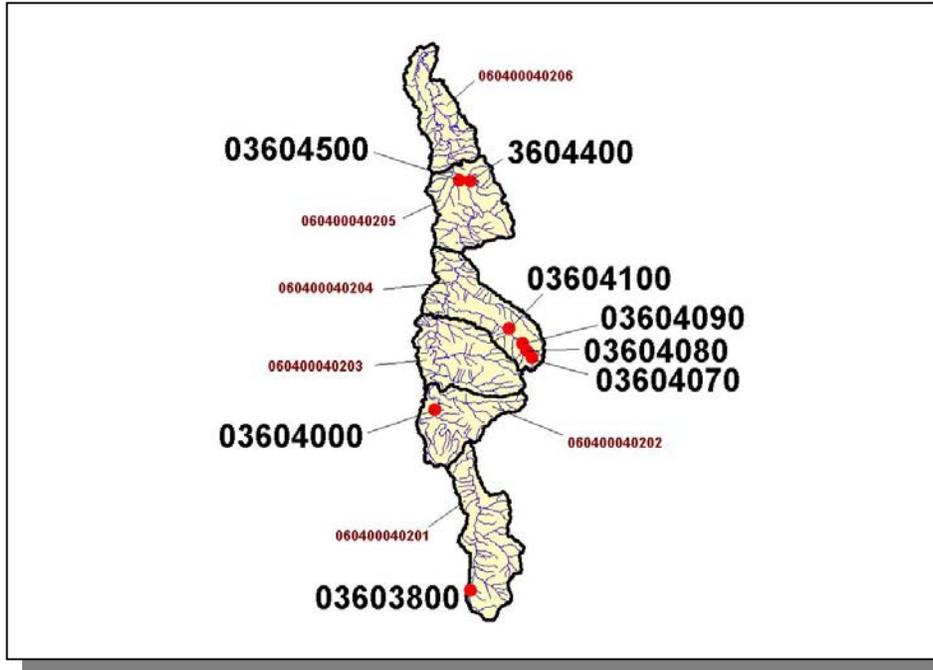


Figure 4-17. Location of Historical Streamflow Data Collection Sites in Subwatershed 0604000402. Subwatershed 060400040201, 060400040202, 060400040203, 060400040205, and 060400040206 boundaries are shown for reference. More information is provided in Appendix IV.

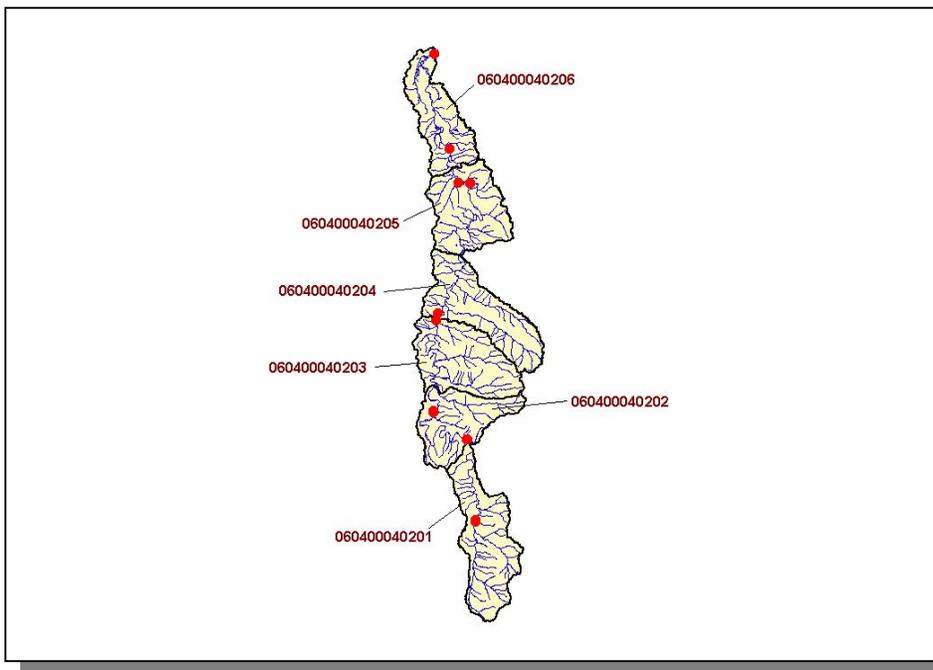


Figure 4-18. Location of STORET Monitoring Sites in Subwatershed 0604000402. Subwatershed 060400040201, 060400040202, 060400040203, 060400040204, 060400040205, and 060400040206, boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.

4.2.B.ii. Point Source Contributions.

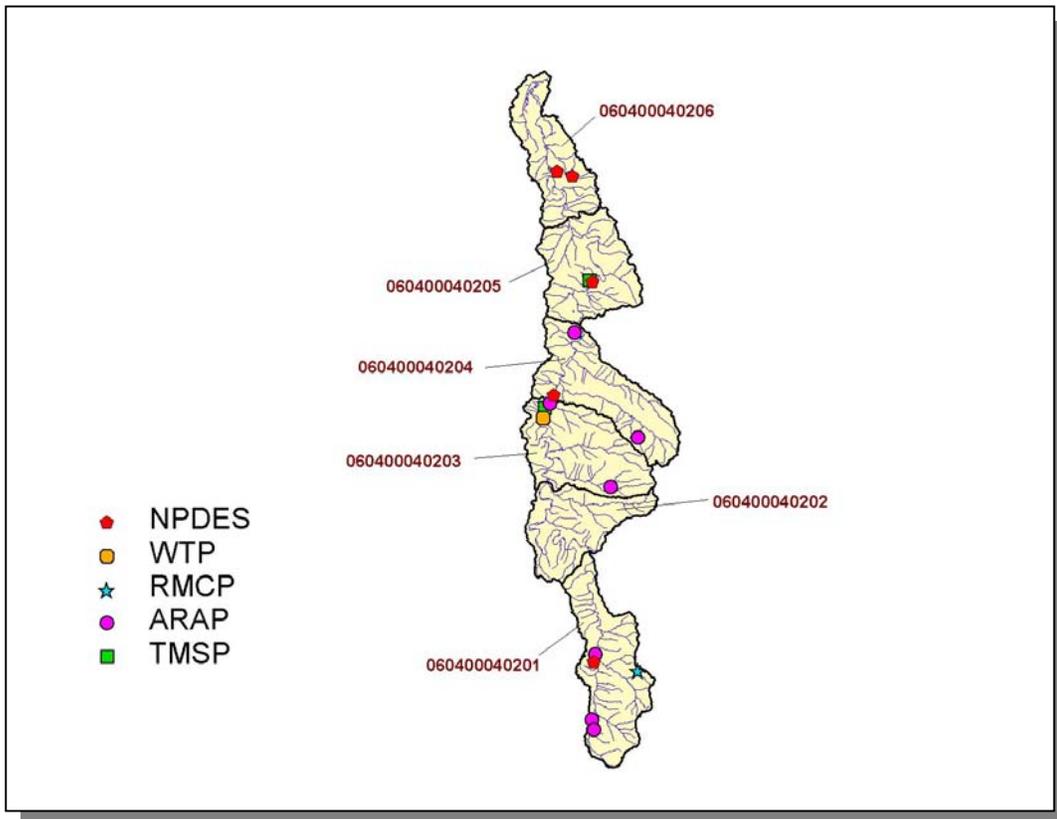


Figure 4-19. Location of Active Point Source Facilities in Subwatershed 0604000402. Subwatershed 060400040201, 060400040202, 060400040203, 060400040204, 060400040205, and 060400040206 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

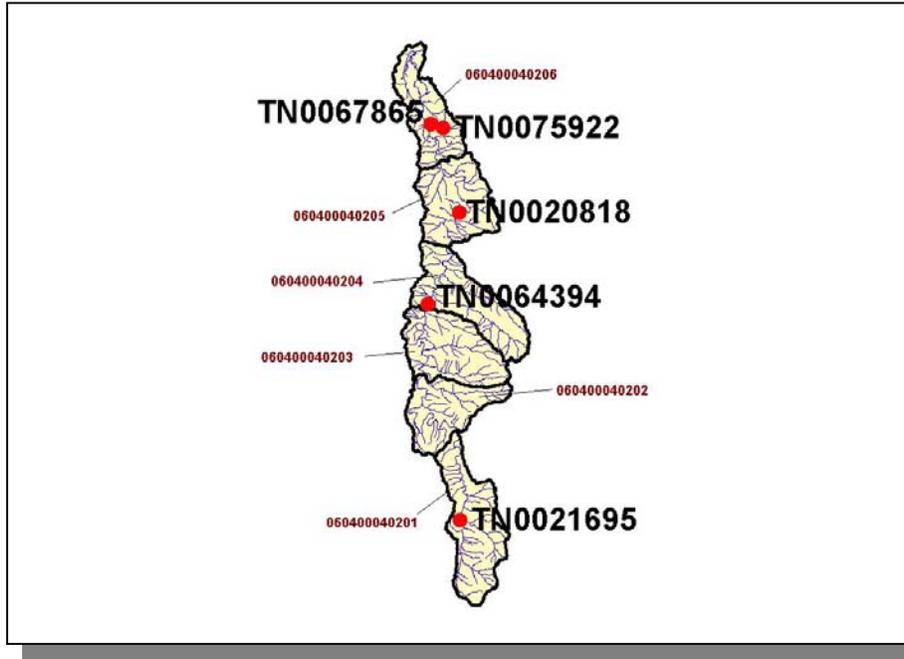


Figure 4-20. Location of NPDES Facilities in Subwatershed 0604000402. Subwatershed 060400040201, 060400040202, 060400040203, 060400040204, 060400040205, and 060400040206 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

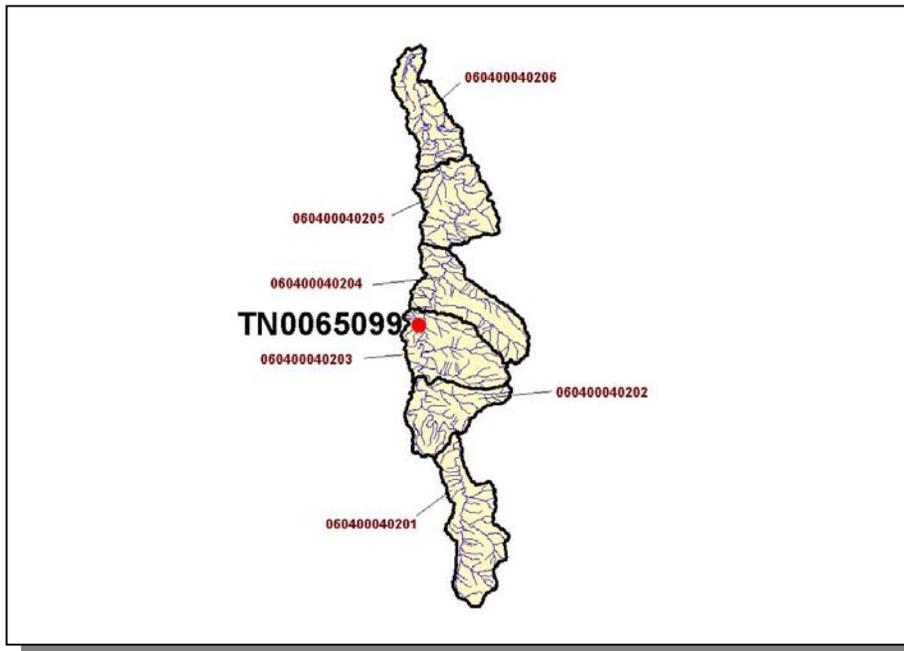


Figure 4-21. Location of Water Treatment Plants in Subwatershed 0604000402. Subwatershed 060400040201, 060400040202, 060400040203, 060400040204, 060400040205, and 060400040206 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

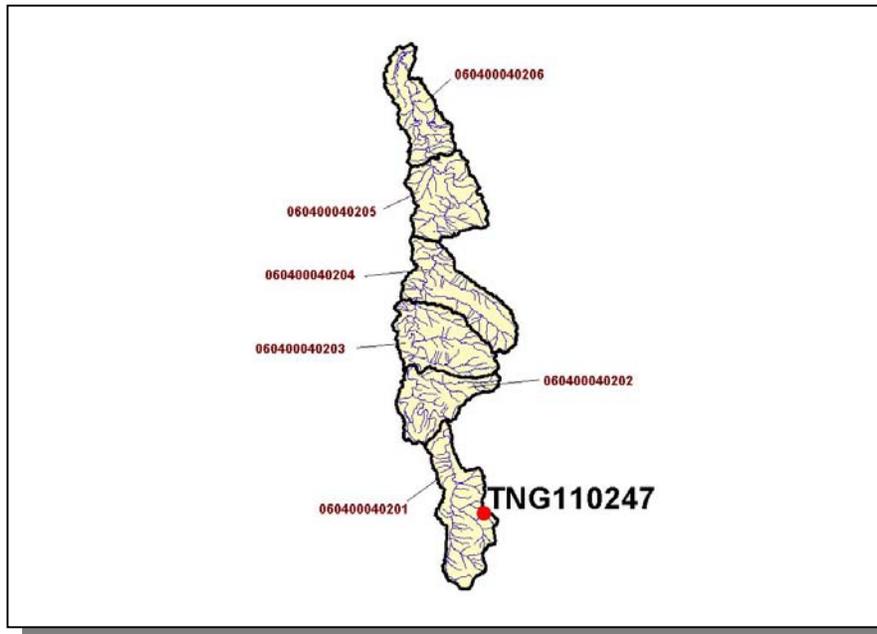


Figure 4-22. Location of Ready Mix Concrete Plants in Subwatershed 0604000402. Subwatershed 060400040201, 060400040202, 060400040203, 060400040204, 060400040205, and 060400040206 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

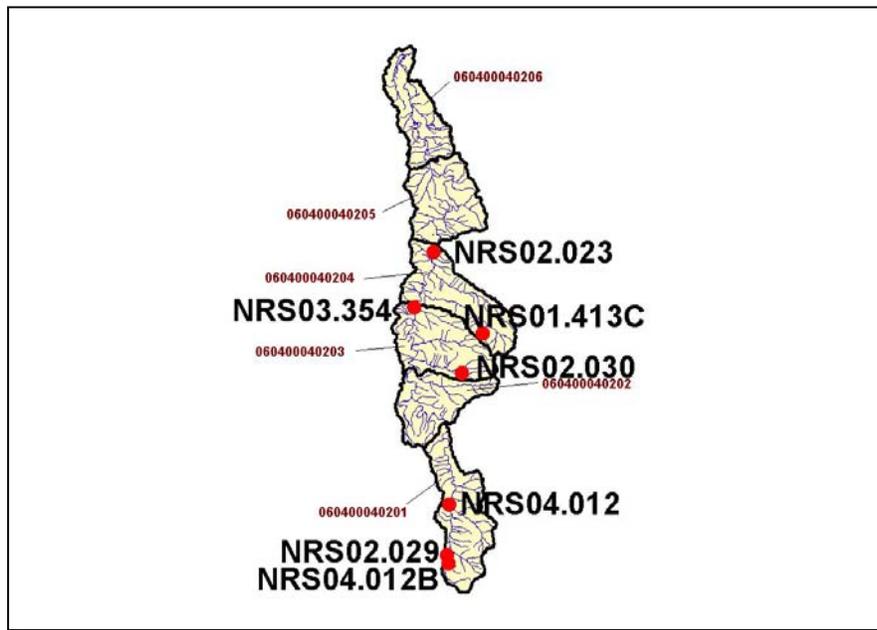


Figure 4-23. Location of ARAP Sites (Individual Permits) in Subwatershed 0604000402. Subwatershed 060400040201, 060400040202, 060400040203, 060400040204, 060400040205, and 060400040206 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

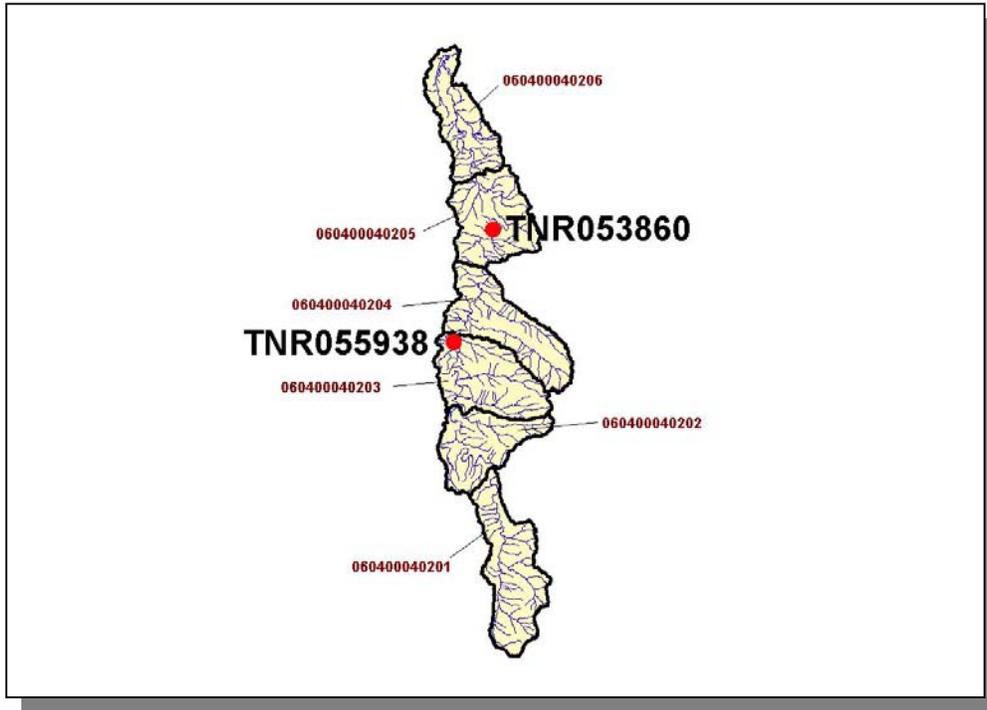


Figure 4-24. Location of TMSF Facilities in Subwatershed 0604000402. Subwatershed 060400040201, 060400040202, 060400040203, 060400040204, 060400040205, and 060400040206 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

4.2.B.ii.a. Dischargers to Water Bodies Listed on the 2002 303(d) List

There is one NPDES facility discharging to water bodies listed on the 2002 303(d) list in Subwatershed 0604000402:

- TN0075922 (Pilot Travel Center #053) discharges to an unnamed Tributary to Black Branch

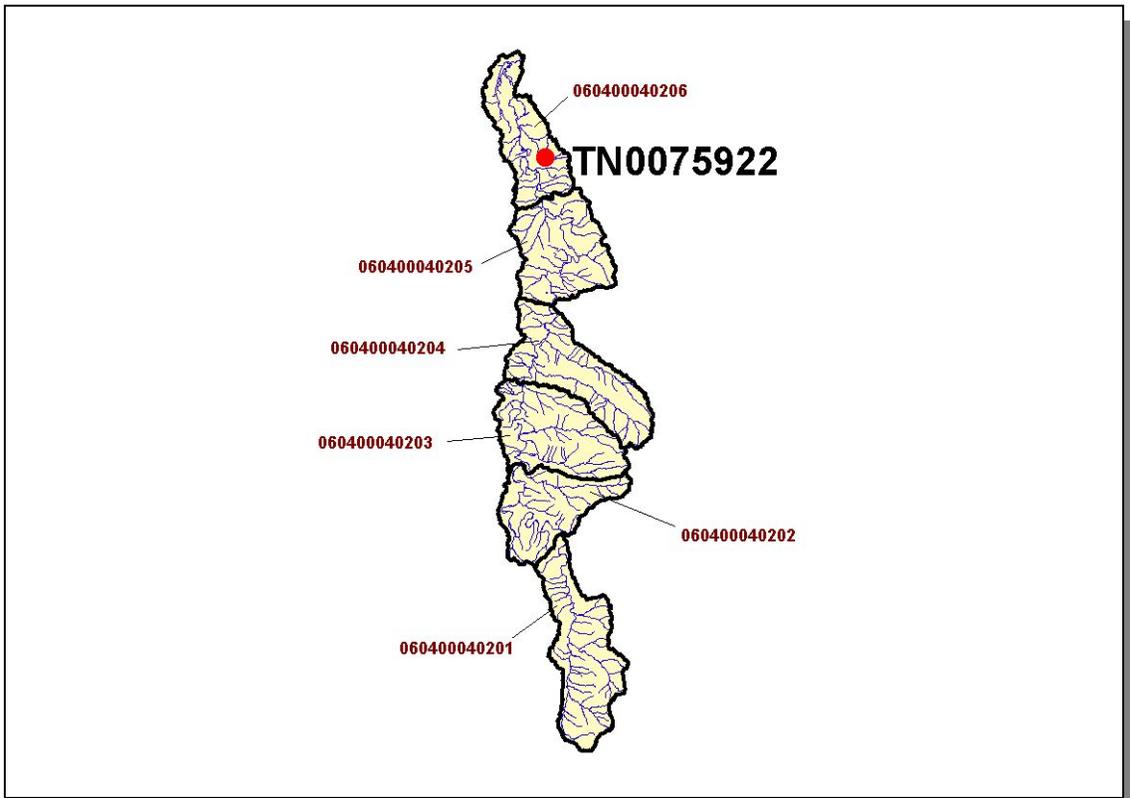


Figure 4-25. Location of NPDES Dischargers to Water Bodies Listed on the 2002 303(d) List in Subwatershed 0604000402. Subwatershed 060400040201, 060400040202, 060400040203, 060400040204, 060400040205, and 060400040206 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0075922	0		0	0	

Table 4-11. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0604000402. Data are in million gallons per day (MGD). Data were obtained from the USGS publication Flow Duration and Low Flows of Tennessee Streams Through 1992 or from permit files.

PERMIT #	WET	TSS	pH
TN0075922	X	X	X

Table 4-12. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0604000402. WET, Whole Effluent Toxicity; TSS, Total Suspended Solids.

PERMIT #	OIL and GREASE	BENZENE
TN0075922	X	X

Table 4-13. Organic Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0604000402.

4.2.B.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Chickens (Broilers Sold)	Hogs	Sheep
6,609	12,861	86	21	9	1,148	26

Table 4-14. Summary of Livestock Count Estimates in Subwatershed 0604000402. According to the 1997 Census of Agriculture (<http://www.nass.usda.gov/census/>), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.

County	INVENTORY		REMOVAL RATE	
	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Hickman	297.2	297.2	5.8	23.0
Humphreys	241.2	241.2	3.7	14.4
Lewis	158.0	158.0	4.0	10.2
Perry	223.6	223.6	5.1	22.0
Wayne	372.6	372.6	14.1	41.1
Total	1,292.6	1,292.6	32.7	110.7

Table 4-15. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0604000402.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.73
Legumes (Pastureland)	0.68
Grass (Hayland)	0.16
Legumes (Hayland)	1.92
Legumes, Grass (Hayland)	0.08
Grass, Forbs, Legumes (Mixed Pasture)	0.43
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	7.14
Sorghum (Row Crops)	4.48
Soybeans (Row Crops)	21.82
Tobacco (Row Crops)	7.68
Other Cropland not Planted	0.65
Conservation Reserve Program Lands	0.11
Non-Agricultural Land Use	0.00
Other Land in Farms	0.99
Farmsteads and Ranch Headquarters	0.40

Table 4-16. Annual Estimated Total Soil Loss in Subwatershed 0604000402.

4.2.C. 0604000403 (Cane Creek).

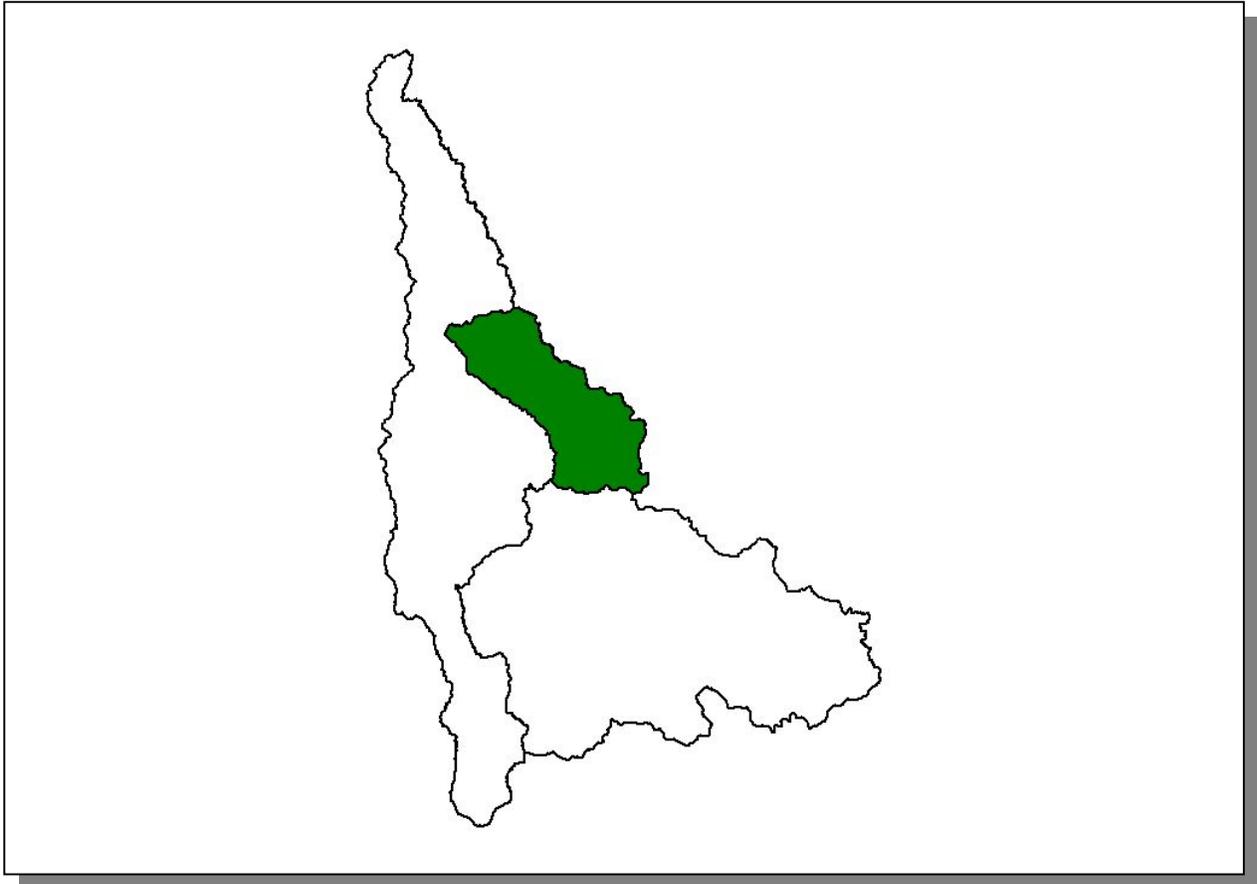


Figure 4-26. Location of Subwatershed 0604000403. All Buffalo River HUC-10 subwatershed boundaries are shown for reference.

4.2.C.i. General Description.

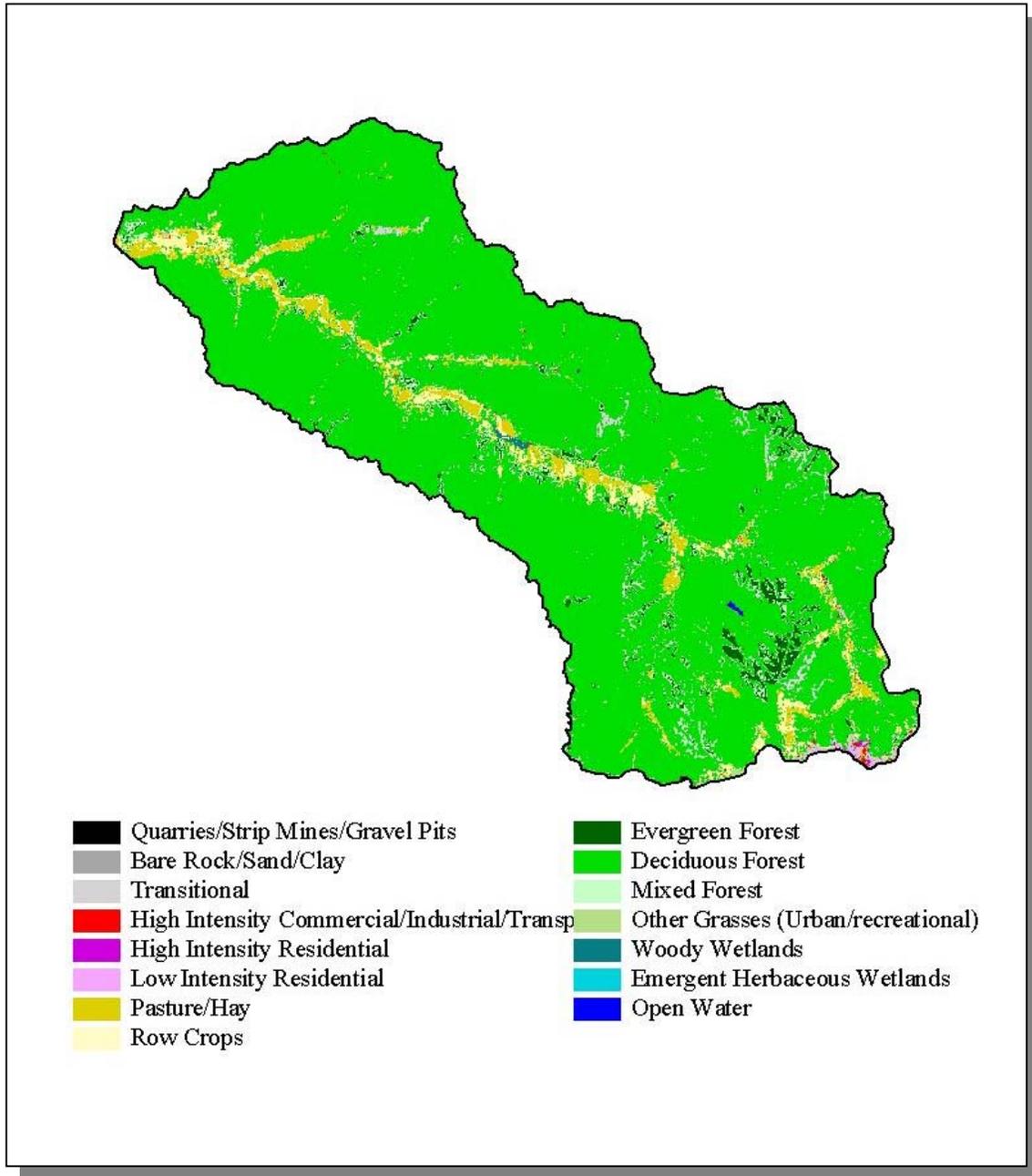


Figure 4-27. Illustration of Land Use Distribution in Subwatershed 0604000403.

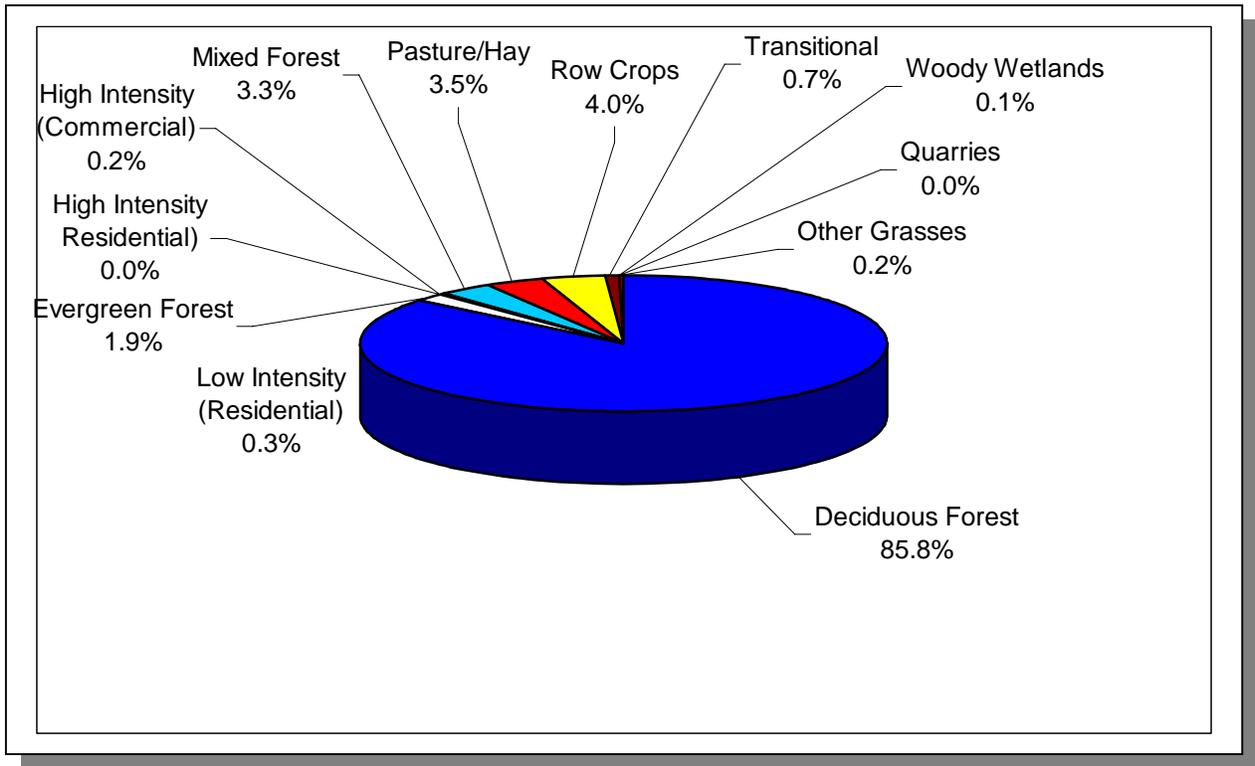


Figure 4-28. Land Use Distribution in Subwatershed 0604000403. More information is provided in Appendix IV.

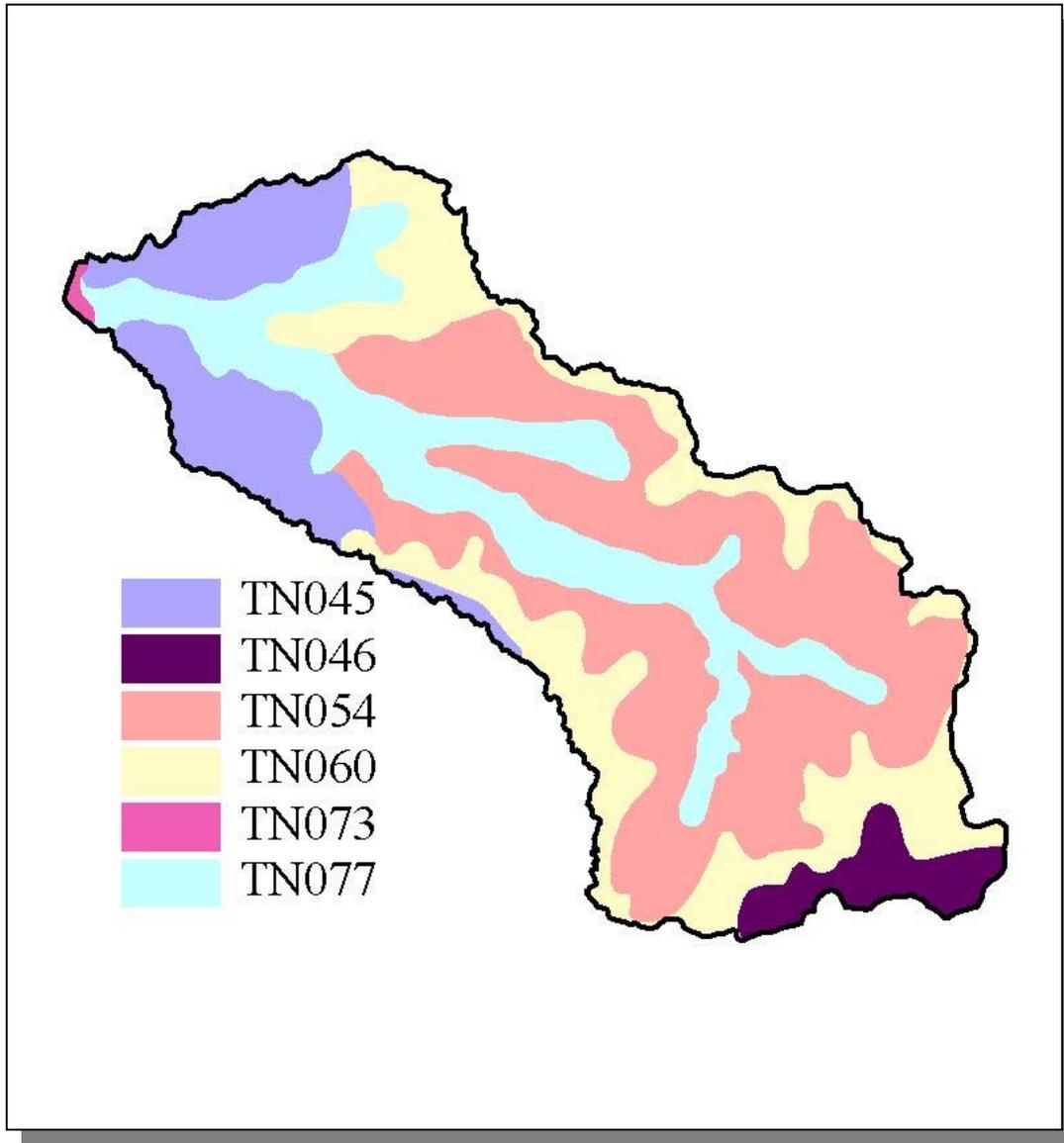


Figure 4-29. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0604000403.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN045	0.00	B	1.95	5.45	Loam	0.35
TN046	0.00	B	1.98	5.09	Silty Loam	0.38
TN054	0.00	C	3.04	4.84	Loam	0.32
TN060	5.00	B	1.30	5.32	Silty Loam	0.39
TN073	0.00	B	2.97	5.21	Loam	0.34
TN077	4.00	C	2.16	5.03	Loam	0.34

Table 4-17. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0604000403. More information is provided in Appendix IV.

County	COUNTY POPULATION			Portion of Watershed (%)	ESTIMATED POPULATION IN WATERSHED			% Change (1990-1997)
	1990	1997	2000		1990	1997	2000	
Hickman	16,754	19,926	22,295	5.86	981	1,167	1,306	33.1
Lewis	9,247	10,789	11,367	12.57	1,163	1,357	1,429	22.9
Perry	6,612	7,438	7,631	3.21	212	239	245	15.6
Totals	32,613	38,153	41,293		2,356	2,763	2,980	26.5

Table 4-18. Population Estimates in Subwatershed 0604000403.



Figure 4-30. Location of Historical Streamflow Data Collection Sites in Subwatershed 0604000403. Subwatershed 060400040301, and 060400040302 boundaries are shown for reference. More information is provided in Appendix IV.

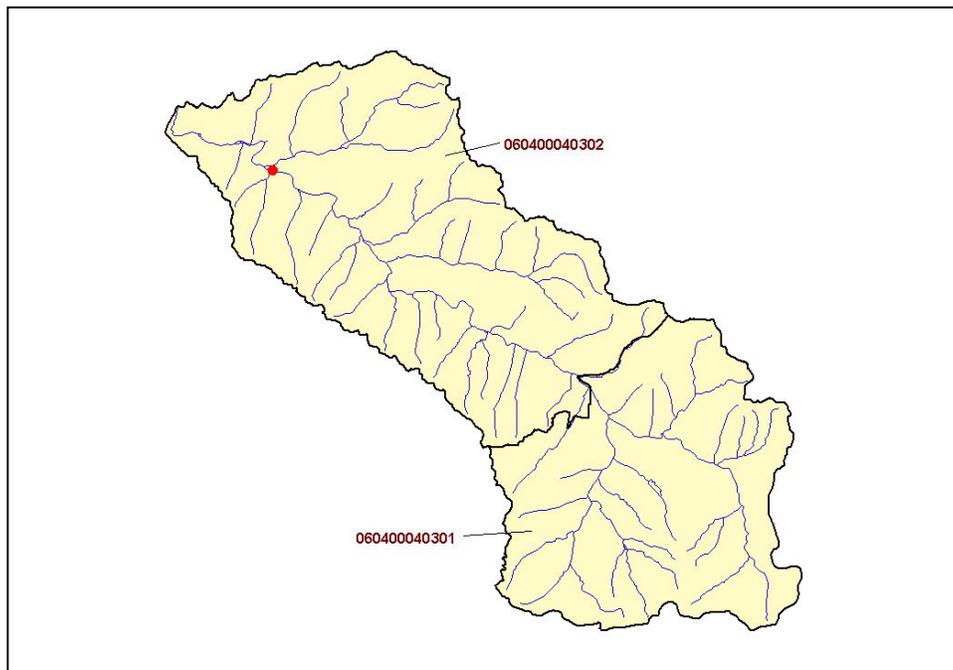


Figure 4-31. Location of STORET Monitoring Sites in Subwatershed 0604000403. Subwatershed 060400040301, and 060400040302 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.

4.2.C.ii. Point Source Contributions.

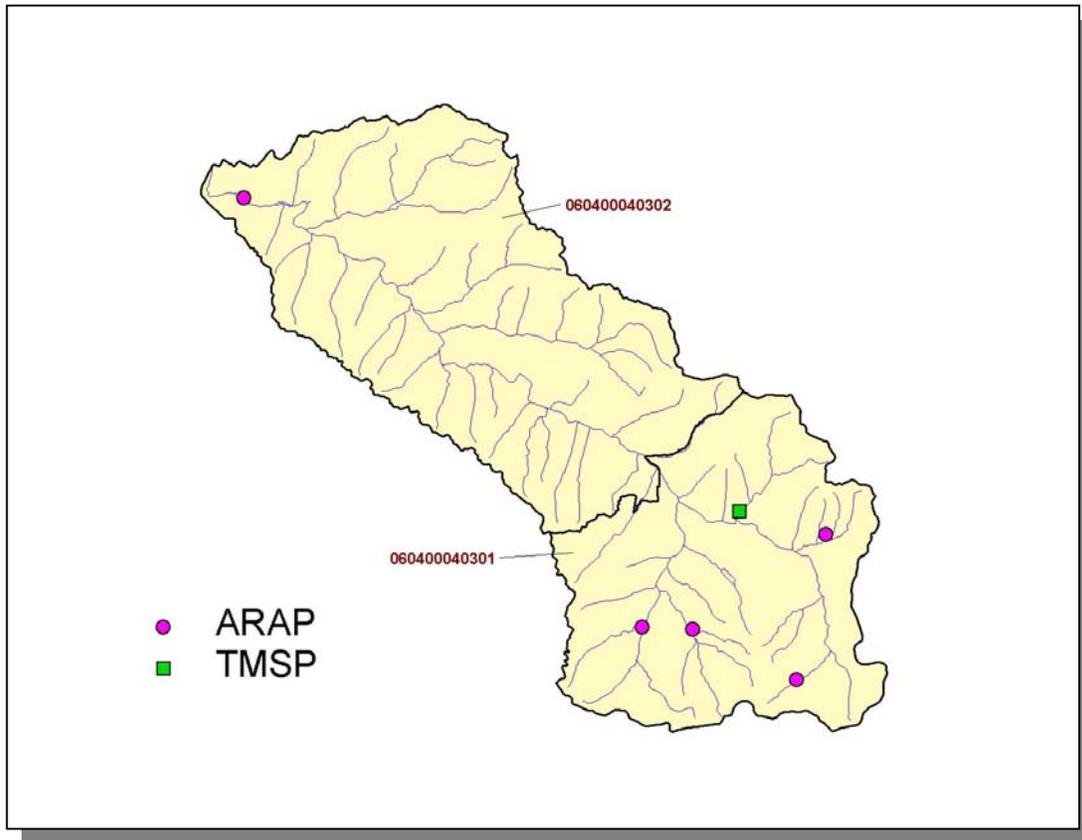


Figure 4-32. Location of Active Point Source Facilities in Subwatershed 0604000403. Subwatershed 060400040301 and 060400040302 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

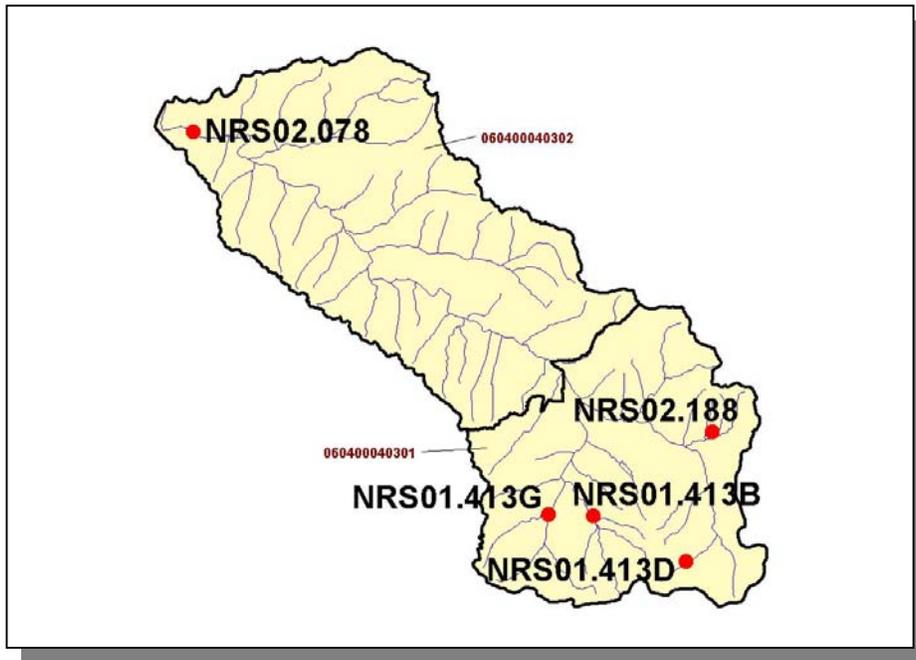


Figure 4-33. Location of ARAP Sites (Individual Permits) in Subwatershed 0604000403. Subwatershed 060400040301 and 060400040302 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.



Figure 4-34. Location of TMS Facilities in Subwatershed 0604000403. Subwatershed 060400040301 and 060400040302 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.

4.2.C.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chicken (Layers)	Chickens Sold	Hogs	Sheep
554	1,031	2	<5	<5	187	4

Table 4-19. Summary of Livestock Count Estimates in Subwatershed 0604000403. According to the 1997 Census of Agriculture (<http://www.nass.usda.gov/census/>), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.

County	INVENTORY		REMOVAL RATE	
	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Hickman	297.2	297.2	5.8	23.0
Lewis	158.0	158.0	4.0	10.2
Perry	223.6	223.6	5.1	22.0
Totals	678.8	678.8	14.9	55.2

Table 4-20. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0604000403.

CROPS	TONS/ACRE/YEAR
Legumes (Pastureland)	0.68
Grass (Pastureland)	1.32
Grass (Hayland)	0.18
Legume (Hayland)	1.05
Legumes, Grass (Hayland)	0.30
Grass, Forbs, Legumes (Mixed Pasture)	0.52
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	2.52
Sorghum (Row Crops)	4.17
Soybeans (Row Crops)	5.35
Tobacco (Row Crops)	7.68
Other Cropland not Planted	0.65
Conservation Reserve Program Lands	0.46
Non-Agricultural Land Use	0.00
Other Land in Farms	1.21
Farmsteads and Ranch Headquarters	0.13

Table 4-21. Annual Estimated Total Soil Loss in Subwatershed 0604000403.